

Genesis

VOICE OF STUDENTS

Chest radiographs made easy

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The aim of this five-part series is to give you a basic system for looking at chest radiographs. It should enable you to say something sensible when presented with a study for interpretation and be confident that you are not missing serious disease when you view a radiograph on your own as a house officer.

Let's start by looking at a normal chest radiograph (figure 1). Use this image as a reference point during the rest of the article. First, some technical details: Quickly look at the film to obtain some useful information about the patient:

- Male or female? Look for breast shadows (this will help you to notice whether a mastectomy has been done)
- Old or young? Try to use the patient's age to your advantage by making sensible suggestions. A 20-year-old is much less likely to have malignancy than someone who is 70
- Good inspiration? It's easy to get tied up in knots over this—and sometimes not get any further. The hemidiaphragms should lie at the level of the sixth ribs anteriorly. The left hemidiaphragm is usually lower than the right
- Good penetration? You should just be able to see the lower thoracic vertebral bodies through the heart
- Is the patient's spine straight? The spinous processes of the thoracic vertebrae should be midway between the medial ends of the clavicles
- Most chest radiographs are taken posteroanterior (PA)—that is, the x-rays are shot through from the back of the patient to the x-ray plate in front of the patient. If the patient is too sick to stand up for this, an anteroposterior (AP) film will be done—that is, the x-rays are shot through from front to back. An AP film will always be labeled as AP, so if nothing is written on the film, it is safe to assume it is PA. PA films are preferred, particularly because the heart is not as magnified as on an AP film, making it easier to evaluate the lungs. Tip: You can avoid the whole PA/AP designation by describing all chest radiographs as "frontal"—that is, you are looking at the patient straight on

You can summarize all the above information in a simple opening phrase: "This is a frontal chest radiograph of a young male patient. The patient has taken a good inspiration and is straight; the film is well penetrated."

While you are saying this, keep looking at the film:

- First look at the mediastinal contours—run your eye down the left side of the mediastinum and then up the right

- The trachea should be central. The aortic arch is the first convexity on the left, followed by the left pulmonary artery; notice that you can trace the pulmonary artery branches fanning out through the lung (see figure 1)
- Two thirds of the heart should lie on the left side of the chest, with a third on the right. The heart should take up no more than half of the thoracic cavity. The left atrium and left ventricle create the left border
- The right heart border is created by the right atrium alone (the right ventricle lies anteriorly and, therefore, does not have a border on the PA chest radiograph). Above the right heart border lies the lateral margin of the superior vena cava
- The main pulmonary arteries and veins and the main bronchi constitute the left and right hila. Enlarged lymph nodes can also occur here, as can primary tumors. These make the hilum or hila seem bulky; note the normal size of the hila on figure 1
- Now look at the lungs. Apart from the pulmonary vessels (arteries and veins), they should be black (because they are full of air). Scan both lungs, starting at the apices and working down, comparing left with right at the same level, just as you would when listening to the chest through a stethoscope. The lungs extend behind the heart, so look there, too. Force your eye to look at the periphery of the lungs—you should not see many vessels here; if you do, then there may be disease of the air spaces, interstitium, or vessels. Don't forget to look for a pneumothorax, in which case you would see a sharp line representing the edge of the lung and no vessels peripheral to the lung edge
- Make sure you can see the surface of the hemidiaphragms curving downward and that the costophrenic and cardiophrenic angles are not blunted, which would suggest an effusion. Check that there is no free air under the hemidiaphragms on an upright film
- Finally, look at the soft tissues and bones. Are both breast shadows present? Is there a rib fracture? This would make you look even harder for a pneumothorax. Are the bones destroyed or sclerotic?

You can summarize your findings as you are looking: "The trachea is central, and the mediastinum is not displaced. The mediastinal contours and hila appear normal. The lungs appear clear, with no pneumothorax. There is no free air under the diaphragm. The bones and soft tissues appear normal."

If you have not seen any abnormality at this point, say so: "I have not yet identified an abnormality, so I will now

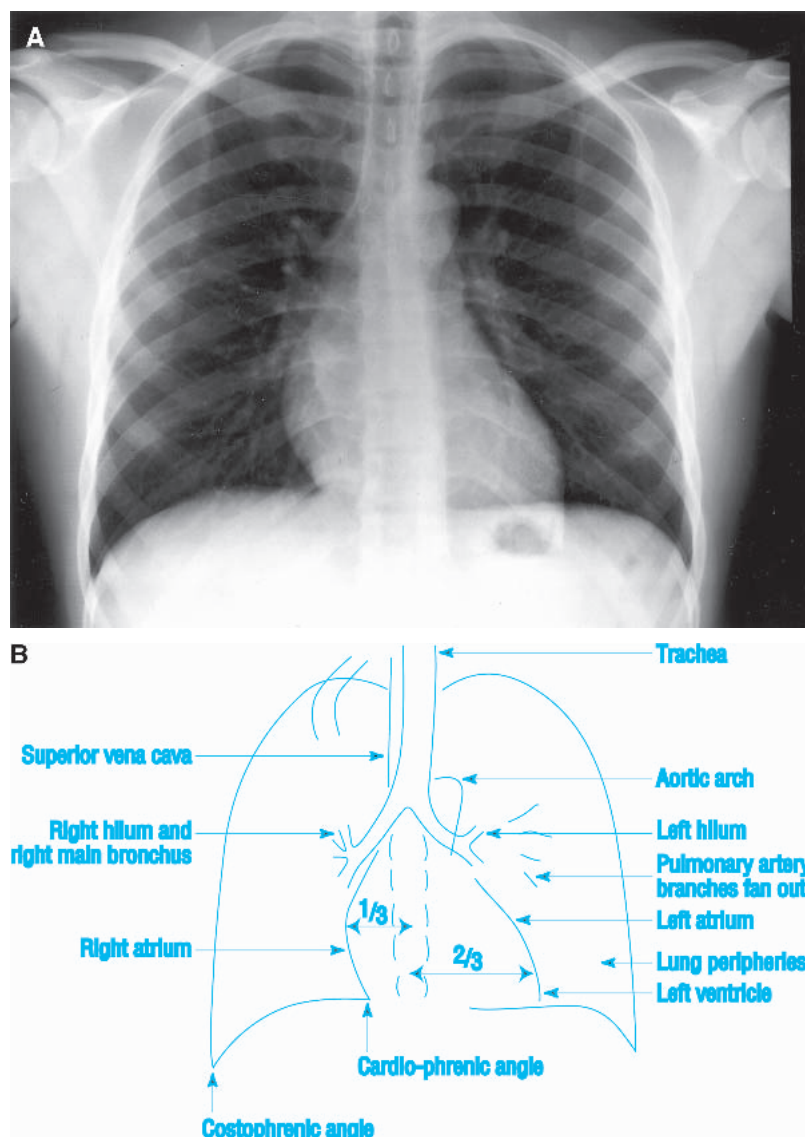


Figure 1 Normal chest radiograph (A) and diagram of structures (B)

look through my review areas.” Then look at the “review areas,” places where disease can be easily missed. These are the apices, the periphery of the lungs, under and behind the hemidiaphragms—don’t forget that the posterior lungs extend well below the diaphragmatic contours—and behind the heart. By the time you have reviewed these areas, you have demonstrated that you are analyzing the film in a logical manner.

You may need to evaluate a lateral chest radiograph (figure 2). The heart lies anteroinferiorly. Examine the area anterior and superior to the heart. This should be black in an adult because it contains aerated lung and the thymus

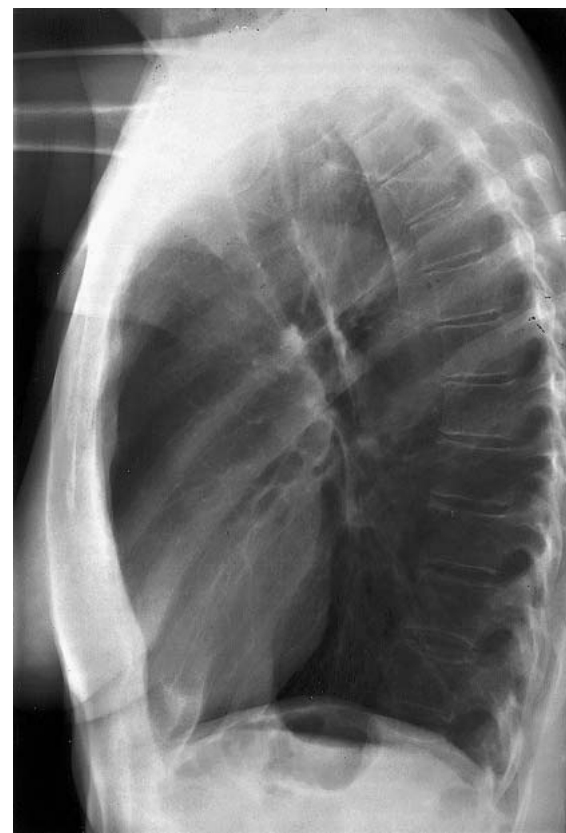


Figure 2 Lateral chest radiograph (normal)

has involuted. Similarly, the area posterior to the heart down to the hemidiaphragms should be black. The blackness in these two areas should be roughly equivalent; therefore, you can compare one with the other. If the area anterior and superior to the heart is opacified, suspect disease in the anterior mediastinum or upper lobes. If the area posterior to the heart is opacified, suspect collapse or consolidation in the lower lobes.

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